

239/227
Patent

1. A stretchable stent, comprising:

a coiled-up sheet having overlapping inner and outer longitudinal sections extending generally parallel to a longitudinal axis thereof, and defining a periphery, the coiled-up sheet being unrollable between a contracted condition and one or more enlarged conditions; and

a plurality of stretchable elements formed in the coiled-up sheet, the stretchable elements comprising an unstretched condition to facilitate placement in a delivery device in the contracted condition and a stretched condition to facilitate expansion of the coiled-up sheet to the one or more enlarged conditions upon deployment from the delivery device, the stretchable elements defining a width about the periphery that is smaller in the unstretched condition than in the stretched condition.

16. A stretchable stent, comprising:

a coiled-up sheet having overlapping inner and outer longitudinal sections extending generally parallel to a longitudinal axis thereof, the coiled-up sheet being expandable between a contracted condition and one or more enlarged conditions, the coiled-up sheet defining a periphery in a plane substantially perpendicular to a longitudinal axis thereof;

a plurality of locking elements extending from the inner longitudinal section for engaging openings in the outer longitudinal section to selectively secure the coiled-up sheet in the one or more enlarged conditions; and

a plurality of stretchable elements formed in the coiled-up sheet, the stretchable elements having a shape memory such that the stretchable elements are plastically deformable towards an unstretched condition at a temperature at or below about 25 degrees Celsius, and biased to expand

239/227

Patent

C2 about the periphery from the unstretched condition towards a stretched condition when exposed to a temperature at or above body temperature.

31. A method for making a coiled-sheet stent, the method comprising the steps of:
providing a substantially flat sheet defining a length and a width, the sheet comprising a shape memory material;
forming a plurality of stretchable elements in the sheet, the stretchable elements being expandable along the width of the sheet between an unstretched condition and a stretched condition, the stretchable elements being biased to expand towards the stretched condition when exposed to a temperature at or above body temperature;
rolling the flat sheet about the width into a coiled-up sheet having overlapping inner and outer longitudinal sections;
constraining the coiled-up sheet with the stretchable elements plastically deformed to the unstretched condition at a temperature at or below about 25 degrees Celsius.

33. The method of claim 31, wherein the step of forming the stretchable elements comprises the steps of:

C4 forming the stretchable elements in the sheet in the stretched shape; and
heat treating the sheet to program the stretched shape into the shape memory material.

44. A method for deploying a coiled-sheet stent at a target treatment location within a patient's body, the method comprising the steps of:

239/227

Patent

providing a coiled-sheet stent comprising a temperature-activated shape memory material, the coiled-sheet stent comprising a plurality of stretchable elements having a shape memory defining an unstretched condition and a stretched condition, the stretchable elements being biased to assume the stretched condition when exposed to a temperature at or above body temperature;

providing the coiled-sheet stent in a contracted condition within a distal end of a tubular sheath at a temperature substantially below body temperature with the stretchable elements plastically deformed to the unstretched condition;

percutaneously introducing the distal end of the sheath into a blood vessel of a patient;

advancing the distal end of the sheath to a target treatment location, the coiled-sheet stent becoming exposed to a temperature within the patient of at least about body temperature during advancement, whereby the stretchable elements become biased to assume the stretched shape; and

deploying the coiled-sheet stent at the target treatment location, the coiled-sheet stent unrolling and at least partially expanding towards an enlarged condition due to the bias of the stretchable elements towards the stretched shape.

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